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are very useful in interpolating positions from an ephemeris, the writer suggests that hereafter such data be published along with an ephemeris. The extra computing necessary to obtain these for a four-date ephemeris would involve but very little time, not more than fifteen or twenty minutes. With this end in view, the formulae for obtaining the daily motion in geocentric declination and in logρ have also been derived. The details of these developments have been forwarded to Popular Astronomy for publication.

June 11th, 1906. RUSSELL TRACY CRAWFORD.

THREE NEW RAPID BINARIES.

It is to be expected that many of the close double stars discovered at the Lick Observatory within the last few years, will prove to belong to the class of short period binary systems. In two instances, A 88 and A 417, this has already been demonstrated, my published measures showing a motion of 128° in five years for the former star, and of 33° in three years for the latter.

Measures made within the last few months show that Hu 1176, A 570, and A 691, also belong to this class. My recent measures and the discovery positions of these stars are as follows:

Hu 1176 = c *Herculis.*

1905.32	111.°7	0.″12	2^n	HUSSEY.
1906.33	90. 4	0. 14	3^n	AITKEN.

A 570.

1903.40	198.°6	0.″20	4^n	AITKEN.
1906.32	172. 6	0. 23	2	"

A 691.

1904.48	226.°1	0.″11	3^n	AITKEN.
1906.35	204. 2	0. 10	1	"

May, 1906. R. G. AITKEN.

THE DUPLICITY OF THE PRINCIPAL COMPONENT OF Σ 2348.

An examination with the 36-inch telescope on the night of May 17, 1906, showed that the principal component of the wide pair Σ2348 was itself, a very close double star. My measure on that night made the distance only $0''.14$ in the position angle $270^\circ.5$. The two components seem to be of the same brightness, each being rated at 6.0 magnitude. The Harvard Photometry gives the star, which is 190 *Draconis* B., the magnitude 5.4. Although the system possesses no sensible proper motion, it belongs to the type of stars in which rapid orbital motion is to be expected.

May, 1906. R. G. AITKEN.

NEW MEMBERS OF THE STAFF OF THE SOLAR OBSERVATORY.

Dr. HENRY G. GALE, recently Instructor in Physics at the Ryerson Laboratory of the University of Chicago, joined the staff of the Solar Observatory in February last. Dr. GALE'S principal work will be in the spectroscopic laboratory on Mount Wilson, where he is carrying on various investigations on arc and spark spectra as related to the spectra of Sun-spots. For several years Dr. GALE has been assisting Professor MICHELSON in his optical investigations, and has thus acquired an experience which will prove of great service in his new work.

Dr. H. K. PALMER, who has recently returned from Chile, where he assisted Mr. WRIGHT in the spectroscopic work of the Mills Expedition of the Lick Observatory, has just joined the staff of the Solar Observatory. Dr. PALMER will for a time assist Mr. ABBOT in his studies of the solar constant, and subsequently take up bolometric investigations of the Sun with the Snow telescope. His acquaintance with reflecting telescopes, derived from his work with the Crossley reflector, as Professor KEELER'S assistant, and his subsequent work in South America should render him a valuable member of our staff. GEORGE E. HALE.

PERSONAL NOTES.

Mr. SEBASTIAN ALBRECHT, fellow in the Lick Observatory during the past three years, received the degree of Doctor of Philosophy, in Astrophysics, at the May commencement of the University of California. The titles of his theses are:

1. A Spectrographic Study of the Fourth Class Variable Stars Y *Ophiuchi* and T *Vulpeculae*.
2. On the Distortion of Photographic Films on Glass.

During the coming academic year, Dr. ALBRECHT will be an assistant in the Lick Observatory, on the D. O. Mills foundation, continuing the measurement and reduction of spec-